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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/858,299	05/15/2001	Zezhang Hou	AUD1P004C1	2952

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EXAMINER	
HARVEY, DIONNE	
ART UNIT	**PAPER NUMBER**
2646	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/858,299	HOU, ZEZHANG	
	Examiner	Art Unit	
	Dionne N. Harvey	2646	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 May 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-39* is/are pending in the application.

4a) Of the above claim(s) *6,8,24 and 25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5,7,9-23 and 26-39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 U.S.C. § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. **Claims 1-5** are rejected under 35 U.S.C. 102(b) as being anticipated by **Matsuo (US 6,757,394).**

Regarding claim 1, **shown in figure 27** and in **column 2, lines 5-8** wherein Matsuo discusses conventional microphone arrays, Matsuo teaches an adaptive directional sound processing system, comprising at least two microphones **2701, 2702**; a subtraction circuit **2704**; a delay circuit **2703** and a delay amount determination circuit ***(located within delay-2703, and which receives the feedback signal for adjusting the delay amount; see column 2, lines 18-23);*** and Matsuo further teaches that the said device is used for the purpose of suppressing noise and thereby aiding in hearing a desired audio signal. For this reason, **figure 27** is interpreted as reading on "a hearing aid device", as broadly claimed.

Regarding claim 2-5, in **column 2, lines 1-5**, Matsuo teaches that the adaptive delay amount varies so as to suppress undesired sound **(see column 3, lines 43-53)**.

2. Claims **7,9-23 and 26-39** are rejected under 35 U.S.C. 102(b) as being anticipated by **Christensen (US 4,131,760).**

Regarding claims 7 and 22, Christensen teaches an adaptive sound processing system comprising at least two microphones **(101,110);** a delay circuit **(114);** a logic circuit **(121)** producing an output signal from the signals following said delay circuit; a delay amount determination circuit **(143** functions to determine the degree of delay**;** also, **see column 6, line 54 – line 57)**; and in **column 7, lines 48-49**, Christensen teaches that echo signals are not in phase with the direct path signals, thereby directionally suppressing undesired sound.

Regarding claims 9-11, Christensen teaches that the delay amount varies to suppress undesired sound, minimize energy of the output signal (**143**) and maximize SNR.

Regarding claim 12, Christensen teaches that the adaptive sound processing system resides within any audio system device including telephones and other audio communications i.e., hearing aids, as claimed.

Regarding claim 13, Christensen teaches that the adaptive delay amount is added to the previously determined adaptive delay amount (**see output of delay element 114 which is added to the initial signal for creation of a new control signal via 121,141,143**).

Regarding claim 14, Christensen teaches that the delay is determined based on a change in energy on the output signal (**141,143; also see column 6, line 53 - column 7, line 10**).

Regarding claims 15 and 16, Christensen teaches that the two possible delay increments are the previous delay increment (decrease of delay) or an inverse previous delay increment (increase of delay), as broadly claimed.

Regarding claims 17 and 35, Christensen appears to teach that the delay increment is determined by multiplying a previous delay increment by the change in energy of the signal, as claimed.

Regarding claim 18, Christensen teaches scaling i.e., increasing or decreasing the change in energy on the output signal (**via 143**), as broadly claimed.

Regarding claim 19, Christensen teaches that the delay determined comprises an energy estimator and a delay generator, which generates a delay based upon the energy estimate (**141,143; also see column 6, line 53 - column 7, line 10**).

Regarding claim 20, Christensen appears to teach that said energy estimator operates at a first sampling rate and said delay generator operates at a second sampling rate, the first sampling rate being greater than the second sampling rate, and wherein down sampling is preformed between said energy estimator and said delay generator to accommodate difference in the first and second sampling rates.

Regarding claim 21, Christensen appears to teach that said energy estimator uses a first time constant and said delay generator uses a second time constant, the first time constant being faster that the second time constant.

Regarding claims 23 and 27, Christensen inherently teaches the methods of claims 23 and 27 by the apparatus of claims 7 and 22; and further teaches inducing the delay amount **114** on at least one of the first and second sound signals; and in **column**

7, lines 48-49, Christensen teaches that echo signals are not in phase with the direct path signals, thereby directionally suppressing undesired noise, as claimed.

Regarding claim 26, Christensen teaches that the adaptive sound processing system resides within any audio system device including telephones and other audio communications i.e., hearing aids, as claimed.

Regarding claims 28 and 29, Christensen teaches that the adaptation operates so to as to minimize energy of the output signal (**143**) and maximize SNR.

Regarding claims 30 and 31, Christensen teaches that combining comprises adding or subtracting (**121**) the first microphone output and the delayed second microphone output, as is well understood in the art.

Regarding claim 32, Christensen teaches that the delay is determined based on a change in energy on the output signal **(114 operates according to the change of energy supplied by element 143; also see column 6, line 53 - column 7, line 10)**.

Regarding claims 33 and 34, Christensen teaches that the two possible delay increments are the previous delay increment (decrease of delay) or an inverse previous delay increment (increase of delay), as broadly claimed.

Regarding claim 36, Christensen teaches scaling i.e., increasing or decreasing the a change in energy on the output signal (**via 143**), as broadly claimed.

Regarding claims 37 and 39, Christensen teaches receiving at least two microphones **101, 110** spaced apart by a predetermined distance, each producing an electronic sound signal; a plurality of delay circuits **105, 114**, each having different delay amounts (***delay 114 is adjustable);*** logic means **121** producing an output signal from

the sound signals following the delay circuits (***outputs of delay circuits are input into logic circuit 121***); and wherein the logic circuit and voltage control **143**, function to "weigh" the sensed signals by microphones **101 and 110**, thereby effectively "selecting one the candidate output signals..." as claimed.

Regarding claim 38, Christensen teaches that the adaptive sound processing system resides within any audio system device including telephones and other audio communications i.e., hearing aids, as claimed.

Response to Arguments

3. Applicant's arguments filed 05/09/2005 have been fully considered but they are not persuasive.

4. In response to applicant's argument that: Matsuo Does Not Produce A Delay Control Signal That Is Supplied To Said Delay Circuit So As To Control The Adaptive Delay Amount:

The Matsuo reference's anticipation of the claimed invention has been clearly set forth in the clarified rejection of claims 1-5, above.

5. Regarding the Applicant's argument that: The Logic circuit that produces an output signal corresponds to the summing circuit 107, not the logic circuit 121:

The Examiner disagrees, as both the summing circuit **107** AND the logic circuit **121** receive an output from respective delay circuits **105 and 114.** Resultantly, both the summing circuit and logic circuit produce and "output", as broadly claimed. Therefore,

the rejection which relies upon logic circuit **121** as reading on the "logic circuit" of the claim, is maintained.

6. Regarding the Applicant's argument that: The Elements **141** And **143** Are Within The Logic Circuit And Therefore Fail To Receive And Output Signal From The Logic Circuit:

The clarified rejection, relying upon element **143** (which is not within the logic circuit) as the delay determination circuit in the Christensen reference, has been provided in the above rejection.

Conclusion

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled □Comments on Statements for Allowance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dionne Harvey whose telephone number is (703) 305-1111. The examiner can normally be reaches on Monday through Friday from 8:30am to 6:00pm.

Any responses to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, DC 20231

or faxed to:

(703) 308-6306, for formal communications for entry

Or:

(703) 308-6296, for informal or draft communications, please label PROPOSED or DRAFT.

Hand delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor(Receptionist)

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dionne Harvey whose telephone number is (703) 305-1111.

D.H.

September 19, 2005

SUHAN NI
PRIMARY EXAMINER